ENVIROTHON

MANUAL FOR COACHES

South Carolina Department of Natural Resources

2008

Table of Contents

 Printed on recycled paper

2007 South Carolina Envirothon Steering Committee Members

Dr. Jack Turner, Chairman
Professor of Biology & WEC Director,
USC Upstate

Kellee Melton, Vice Chair
State Technology Coordinator
USDA-Natural Resources Conservation Service

Hugh Caldwell, Past Chairman
District Manager
Richland Soil and Water Conservation District

Diane Curlee, Secretary/Treasurer
Education Coordinator
Orangeburg SWCD

Joy Sullivan, Member
Envirothon Coordinator
SC Department of Natural Resources

Mary Jane Henderson, Member
Education Coordinator
Richland Soil and Water Conservation District

Ed Falco, Member
State Environmental Curriculum Coordinator
SC Department of Education

Tammy Wactor, Wildlife Station Manager
Program Coordinator
SC Department of Natural Resources

Lindsay Fairchilds, Orals Station Manager
Region Four Coordinator
SC Department of Natural Resources

James "Trip" Miller, Forestry Station Manager
Harbison State Forest Manager
SC Forestry Commission

Samuel St. Louise, Forestry Station Manager Forest Technician II
SC Forestry Commission

David Ruff, Aquatics Station Manager
Chemist II
SC Department of Natural Resources

Jackie Reed, Soils Station Manager
Soil Scientist
USDA-Natural Resources Conservation Service

Caleb Gulley, Soils Station Manager
Soil Scientist
USDA-Natural Resources Conservation Service

Bryn Harmer, Current Topic Station Manager
Manager, Woods Bay State Natural Area
SC Department of Parks, Recreation & Tourism

Crystal Robertson, Current Topic Station Manager
State Parks Trails Coordinator
SC Department of Parks, Recreation & Tourism

Amy Maxwell, Public Affairs
Public Affairs Specialist,
USDA-Natural Resources Conservation Service

Sabrenna Bryant, Public Affairs
Public Affairs Assistant
USDA-Natural Resources Conservation Service

1 Introduction and Goals

Welcome to the 2008 South Carolina Envirothon. This handbook contains information you will need to know to participate in this event. We are sure your participation will be beneficial and prove to be a valuable learning experience.

The Envirothon is an integrated education experience. Over the course of several months of study participants prepare themselves for testing in the six stations.

The current topic is Recreational Impacts on Natural Resources. This year's Envirothon is a tremendous opportunity to learn more about the issues surrounding this topic while promoting team work and critical thinking skills in your students.

Designed to foster cooperation and teamwork, teams are tested not only on their basic knowledge in these topic areas, but their ability to apply that knowledge to solve real-life problems. Problem solving and teamwork are skills that will enhance the participants' ability to take leadership roles after high school or college, no matter what their chosen field or career.

The Envirothon began in Pennsylvania in 1979 in a single county. The program had such appeal that by 1988, it had expanded into three states and had taken on a national scope. Since that time, the program has grown to include 42 states and 8 Canadian provinces.

The overall goal of the Envirothon is to promote environmental education so that succeeding generations will be more environmentally literate, and possess the skills and knowledge to make informed decisions regarding the environment.

The Ecosystems Approach

One goal of Envirothon is to promote the desire of students to learn more about the environment, and to apply principles of resource management and ecology. Any ecological system (ecosystem) consists of a community of living organisms and their local physical environment. The living and non-living elements of an ecosystem are connected through flows of energy and the cycling of chemical elements. No single organism, population or species is able to produce all of its own food and to recycle all of its metabolic products. This ecosystem concept is important because it conveys one of the key insights that we have learned from the science of ecology .... everything is related to everything else.

Another goal of Envirothon is for students to develop critical thinking and problem solving skills. Environmental problems are effectively addressed by considering the interacting elements of a system, not each sector in isolation. Ecosystem management is currently the standard approach for many government, industry and community based initiatives. The South Carolina Envirothon has adopted the ecosystems approach.

Written tests will occur at testing stations. Each station will focus on one of the five core subject areas. However, each station will incorporate elements of the other subjects. Questions at the stations, as well as the oral presentation scenario, will be multifaceted to ensure that students will be challenged to think critically and consider "the big picture".

Questions regarding the SC Envirothon may be directed to Joy Sullivan, Envirothon Coordinator-Land, Water & Conservation Division of the South Carolina Department of Natural Resources (803)359-3165 or SullivanJ@dnr.sc.gov .

2 Quick Facts Sheet for Teachers and Administrators

The Envirothon is North America's largest environmental competition for high school students.

The SC Envirothon was formally endorsed by SC Superintendent of Education, Inez Tenenbaum in November of 1999 as a worthwhile educational experience.

A Coaches' Workshop will be held Saturday, February 9, 2008 to assist teachers in preparing their teams. Teachers will receive resource packets and attend classes in each of the five topic areas (Soils, Forestry, Aquatics, Wildlife and Recreational Impacts on Natural Resources).

Team registration is $100, complete the team registration form and mail it with your check to:
Diane Curlee
1550 Henley St. NE, Rm 103
Orangeburg, SC 29115.
The deadline for registering is March 31st, 2008. You do not have to register a team to attend the training.

On the day of the Envirothon competition, May 2, 2008, each team will complete five written exams and perform their Oral Presentation for a panel of judges. (This is a rigorous academic test, not a field trip!)

The team scoring the highest overall will go on to represent the state at the Canon Envirothon scheduled for July 28-August 3, 2008 at Northern Arizona University, Flagstaff, AZ.

"The Envirothon is an excellent way for teachers to engage their students by using standards-based curriculum materials while fostering critical thinking and leadership skills. It provides many real world examples of common classroom concepts and emphasizes how environmental problems require an interdisciplinary approach. I would encourage all teachers to explore the benefits of incorporating the Envirothon into their curriculum."

- Linda Sinclair, State Science Coordinator
- SC Department of Education

“The Envirothon makes a difference to me because….”

Anonymous quotes from student evaluations of Envirothon competitions:

“Envirothon has taught me a great deal about problems in our neighborhoods. Now I know how to deal with it and pass on my knowledge.”“I realized that environmental science is more interesting than I thought.”

“I gained knowledge of water quality and nonpoint-source pollution.”“The competition was great. I enjoyed it. The experience was wonderful. I made new friends at the competition.”

“The most important part of the competition to me was learning how to synthesize all the information into an Oral Presentation.”“I learned that different areas have different species of wildlife, trees, etc.”“The most important part of the competition for me was working with friends on a long-term goal.”“Nonpoint source pollution has more effect on the environment than I realized.”“I learned a lot of valuable information for the future.”“I had a good time.”“I learned a lot about the world around us.”“What was most important to me was learning to do things differently for the environment.”

Comments from Coaches evaluation forms:

“My students really enjoy the Envirothon and we learn a lot together!”

— Twila Shaw, James Island Christian School, Charleston

“The Envirothon is science in action and emphasizes real world problems!”

— Robert Brady, Blue Ridge High School, Greer

“This is a valuable program, especially for students who are interested in South Carolina’s natural resources.”

— Cynthia Gardner, White Knoll High School, Lexington

“It’s a great way to involve students and it fits easily into my daily lesson plans.”

— Stephanie Taylor, Mauldin High School, Mauldin

“The Envirothon competition has been a wonderful tool in teaching my students about our environment! It encourages teamwork and the desire to learn as much as possible. Thanks to the coordinators of the Envirothon for listening to the suggestions of the students over the past four years that we have been involved. It means a lot to them to know that their opinion is valuable. The second and third place prizes that were added last year have been particularly encouraging to the team. These prizes encourage even a fledgling team to participate. Thanks for all you do for our students!

— Ruth Taylor, Mayo High School for Science, Math and Technology, Darlington SC

3 Sponsors

The South Carolina ENVIROTHON is conducted in partnership with:

SC Soil and Water Conservation Districts
SC Department of Natural Resources
SC State Energy Office
SC Forestry Commission
SC Department of Education
Clemson University
USDA - Natural Resources Conservation Service
Soil & Water Conservation Society - SC Chapter

Funding is provided by "Friends of the ENVIROTHON" (individuals, industry, and businesses). For more information, or if you desire to financially support the South Carolina ENVIROTHON, please contact your local Soil & Water Conservation District.

Additional funding is provided by individual Conservation Districts.

Friends of the Envirothon include:

Power for Wildlife
LanXESS
NBSC
Clemson University Sandhill Research and Education Facility
Canon USA, Inc.
Clemson University Cooperative Extension
Johnson, Johnson, Whittle & Snelgrove
Environmental Education Association of South Carolina
Harry Hampton Fund
Harry O. Weeks Jr.
John H. Parris
South Carolina Conservation Districts Foundation, Inc.
South Carolina Soil and Water Conservation Society
Southeastern Clay Company

All of the Conservation Districts of South Carolina (See page 41 for contact information)

Abbeville County
Aiken County •
Allendale County •
Anderson County
Bamberg County
Barnwell County •
Beaufort County •
Berkeley County •
Calhoun County •
Charleston County
Cherokee County
Chester County •
Chesterfield County •
Clarendon County •
Colleton County •
Darlington County •
Dillon County •
Dorchester County •
Edgefield County •
Fairfield County •
Florence County •
Georgetown County •
Greenville County •
Greenwood County •
Hampton County •
Horry County •
Jasper County
Kershaw County
Lancaster County
Laurens County
Lee County
Lexington County
Marion County
Marlboro County
McCormick County
Newberry County
Oconee County
Orangeburg County
Pickens County
Richland County
Saluda County
Spartanburg County
Sumter County
Union County
Williamsburg County
York County

4 The State Competition

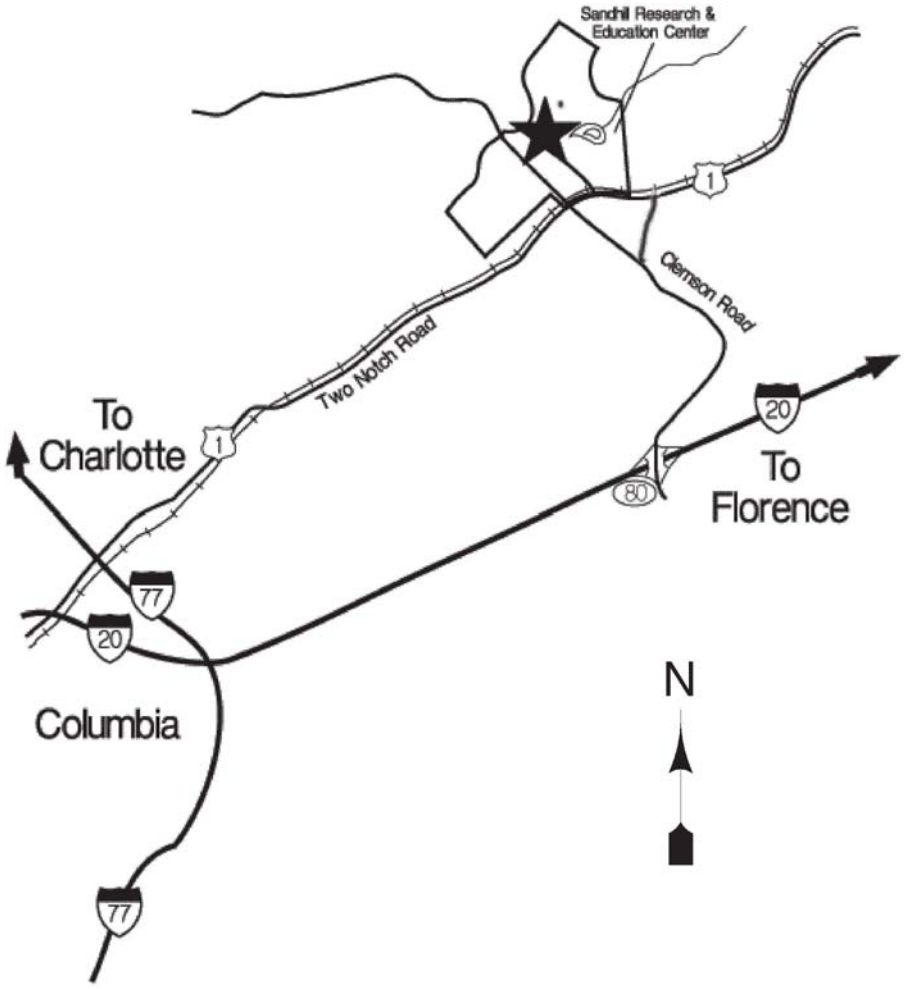
The 12th annual statewide Envirothon competition for South Carolina will be held at Clemson Institute at Sandhill Center near Pontiac, South Carolina on Friday, May 2, 2008.

A schedule will be mailed to coaches prior to the event.

SC Envirothon Sample Schedule

8:00 a.m.	Volunteer Registration
8:30 a.m.	Team Registration begins, Team photos
9:30 a.m.	**Opening Ceremony at Awards Stage**
9:45 a.m.	Guides escort teams to first station,
10:00 a.m.	**Competition begins**
10:30 a.m.	Horn ends Test Session #1, Teams rotate
10:35 a.m.	Test Session #2 begins
11:05 a.m.	Horn ends Test Session #2, Teams rotate
11:10 a.m.	Test Session #3 begins
11:40 a.m.	Horn ends Test Session #3, Teams rotate
11:45 a.m.	Test Session #4 begins
12:15 a.m.	Horn ends Test Session #4, Teams rotate
12:20 p.m.	Test Session #5 begins
12:50 p.m.	Horn ends Test Session #5, Teams rotate
12:55 p.m.	Test Session #6 begins
1:25 p.m.	**Horn ends Test Session #6**
1:30 p.m.	Lunch near Awards Stage
2:00 p.m.	**Awards Ceremony**

5 How to Get There



Take I-20 to Exit 80 (Clemson Road). Take Clemson Road north past McDonald's, follow straight and go over the bridge. At light take a right into the Sandhill complex. Follow directional signs for "Envirothon". The entrance off Two Notch Rd. at the RR tracks has been closed to outside traffic.

For more information contact:

Clemson University Center for Community & Economic Development
Formerly Sandhill Research and Education Center
900 Clemson Rd. Columbia, South Carolina 29224-3205
Telephone: (803) 788-5700 Fax: (803) 736-4418

6 Rules for Competitors

1 Students in grades 9-12 or their equivalent as of January 1, 2008 are eligible to participate.

2 Teams must have at least three and not more than five members. Each team must be accompanied to the competition by a coach or advisor. Transportation to and from the competition is the responsibility of the team and their coach/sponsors.

3 A school may send up to two teams to the state competition. Each team will consist of members from the same school, organization and/or association. Two schools may join together to send a joint team, but then forfeit their rights to send individual teams (a school may not contribute members to more than one team).

4 **Only ONE alternate will be allowed per team.** Additional students will not be allowed to participate in the competition.

5 Thirty (30) minutes will be allotted for each of the five testing stations during the competition as well as the oral presentation station.

6 There will be written questions at each of the five testing stations. Question format may be true/false, multiple choice, matching, fill in the blank or practical exercises.

7 Test questions will be taken from the information in the suggested references provided to coaches by the Envirothon Committee.

8 During the competition, team members will work together to answer the test questions, completing one test and submitting it to the resource professional in charge of the station before moving on to the next station. Once the competition has begun, the team will rotate through all six stations **AS A TEAM.**

9 The resource professional in charge of the testing station has final authority with respect to the test questions and answers.

10 In the event of a tied score for first, second or third place, the team with the highest score on the Oral Presentation will be considered the winner. Further rules are documented and available to determine winners in the event a tie still exists.

11 Oral presentations will be evaluated by a panel of five judges. The high and low score from each panel will be discarded and a team's oral presentation score will be the average of the remaining three scores.

12 The state winner is eligible to compete at the Canon Envirothon. If the state winner cannot participate, the second place team may represent South Carolina in the North American competition.

13 In the event a procedural dispute or question arises that is not covered in this manual or its addenda, the issue will be decided by a committee made up of the resource persons assigned to the testing stations and the Envirothon Coordinator.

14 Team members (or others with the teams) with allergies or medications must bring their own supplies.

15 Cameras and video recorders, laptops, and tape recorders are prohibited in the vicinity of the testing stations. Allowances will be made in advance for the press.

16 The competition will be held outside regardless of the weather. Team members should wear appropriate clothing (sneakers, jeans/shorts, tee shirts). If it is warm and sunny, please consider sun screen. **(Do not wear any item of clothing that may identify your team by city, county or school.)**

17 Any infraction of the rules will be reviewed by the Steering Committee and may become grounds for disqualification. The rules of the SC Envirothon are subject to change on a majority vote of the Steering Committee. Any changes will be published and distributed prior to the State Competition.

7 Coach's Pre-Competition Checklist

The Coach is the backbone of the Envirothon team. This person serves to organize the team, motivate the members, and present materials pertinent to the Envirothon. Throughout the year, the coach guides the team's preparation for the competition. There are two major components of the coach's job--teaching team skills and transferring to the members a strong environmental ethic. A coach has a tremendous responsibility and is to be congratulated for making such an important contribution to the growth of the team members' knowledge and experience.

Maintain close contact with the local Conservation District Office (a directory is included in this handbook). Ensure the following check-list is completed:

_____ $100.00 Registration Fee paid and participation confirmed with local Soil & Water Conservation District by the registration deadline of March 31st, 2008.
All registration fees are non-refundable.

_____ Transportation has been arranged to the state competition.

_____ Coach has signed up for Coaches Workshop February 9th, 2008 and confirmed attendance with Envirothon Coordinator (attendance is not mandatory). Workshop registration deadline is January 25th, 2008.

_____ Coach has sent in the Team Registration Form listing who the team members will be by the March 31st, 2008 deadline. Make sure all the team members have sent in both the medical and photo release forms. Failure to do so may be grounds for disqualification.

_____ Team members are familiar with rules of the competition.

_____ Team members are trained in each of the five test areas: Soils, Aquatics, Forestry, Wildlife, and Recreational Impacts on Natural Resources.

_____ Team has prepared their oral presentation and visual aids in accordance with the rules.

8 Day of the Event Reminders

1 **BE ON TIME**! Allow ample travel time. Arrive 30 minutes prior to your assigned registration time.

2 Report to the registration tent to receive instructions and supplies. (Coach only)

3 Everyone MUST wear their name tags (provided at Registration). Persons not wearing name tags at the testing stations will cause their teams to be disqualified. Advisor name tags are coded differently from team name tags.

4 **COACHES MAY NOT CONSULT WITH OR ACCOMPANY THEIR TEAM ONCE THE COM-PETITION HAS BEGUN!** Failure to follow this rule may result in disqualification.

5 No pets of any type allowed on the competition site. No alcohol, drugs or tobacco will be allowed. No smoking is allowed on the competition site.

6 Winning teams must complete necessary paperwork before leaving the competition, see Awards and Recognition.

7 **Familiarity with the rules and regulations of the competition is expected of all coaches and team members.** Ignorance of a rule is not an acceptable excuse for failure to comply.

9 Awards and Recognition

Awards will be given in the form of a scholarship to the college or university of the recipient's choice, or a 'cash' award which will be mailed to the recipients after the competition. All participants will receive an Envirothon T-Shirt and promotional items available for that year.

1st Place - $500 per student, $500 coach
2nd Place - $250 per student, $250 coach
3rd Place - $125 per student, $125 coach
Honorable Mention - $75 per student, $75 coach — Cash Award
NEW in 2008: The Envirothon Steering Committee voted to discontinue the Station Awards. Since all recipients in the past were members of the top 3 teams, the Station Awards were found to be redundant. Those funds will be used to sponsor the first place team to the Canon Envirothon.

CLAIMING YOUR SCHOLARSHIPS AND AWARDS

After the competition ends and winners are announced, paperwork will be provided to the winners. The paperwork must be completed so that the Envirothon has a record of individual's names, addresses and other personal information. A check will be mailed to the individuals approximately (3) weeks following the competition. For claiming scholarships, see the sample letter below.

SAMPLE LETTER

May __, 20__

Congratulations! As a member of the First Place Team at the 20__ SC Envirothon, you have won a $500 College Scholarship!

To claim your scholarship you must be enrolled in an accredited two-year or four-year college or university. Once you are registered with your school, send a written request to the address below:

Joy Sullivan,
Envirothon Coordinator
123 Park Rd.
Lexington, SC 29072

Along with your letter, you must include:
· • proof of enrollment (a notarized letter from the registrar or a copy of your official transcript) and · the address of the college Treasurer's Office. · • a copy of this letter

Checks will be made payable directly to the school and mailed to the Treasurer's Office. Scholarship requests take 4-6 weeks to process.

Your scholarship will be available to you for five years from the date of this letter.

If you have any questions regarding your scholarship, feel free to contact the SC Envirothon Coordinator, Joy Sullivan, at (803) 359-3165 or email her at SullivanJ@dnr.sc.gov .

10 **Soils**

Station Managers: Jackie Reed & Caleb Gulley — USDA-NRCS

Learning Objectives:

1 Explain the diagnostic significance of soil color. Be able to describe how soil color is measured and what processes produce different colors.

2 Describe the factors which influence soil texture and structure and be able to explain how these properties influence a soil's ability to retain water and nutrients and tendency to erode. Explain how this further influences the hydrologic and nutrient cycles in an ecosystem.

3 Derive information from a soil survey and explain the interaction between soil type and plant communities as well as suitability for various land use practices.

4 Explain the features of a soil profile, the five factors of soil formation and the origin of soil parent materials.

5 Describe the characteristics of wetland soils and explain where wetlands are found and why.

6 Describe various soil constituents (sand, silt, clay, organic matter) and their properties. Relate these properties to soil fertility nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), soil pH and nutrient cycles.

7 Be able to give an overview of soils of the world including environmental factors of soil formation, natural vegetation types and soil fertility, and world geology.

8 Be able to describe South Carolina Landform Regions and what they indicate about SC geology, climate and land uses.

9 Identify and understand how recreational activities impact soil erosion, soil compaction, and water quality.

10 Be familiar with ways that people might reduce the negative impacts they have on natural resources while recreating.

11 **Aquatics**

Station Manager: David Ruff, SCDNR

Learning Objectives:

1 Identify and describe the phases of the water cycle. Understand the chemical and physical properties of water and explain their implications for aquatic ecosystems.

2 List and describe the pollutants and contaminants typically associated with non-point source pollution. Be able to provide examples of best management practices (prevention and reduction techniques) that address non-point source pollution.

3 Know how to use a key, and visual characteristics to identify aquatic organisms. Know why aquatic macro-invertebrates are good bio-indicators of water quality. Give examples of aquatic macro-invertebrate sampling techniques and equipment.

4 Understand how to delineate the watershed boundary for a small water body. Be able to determine if a watershed boundary has been drawn appropriately.

5 Understand the processes that allow groundwater to be stored, replenished and utilized. Explain the different types of aquifers and how each type relates to water quality and quantity.

6 Identify wetland functions and know the characteristics used to define a wetland. Know how to identify the characteristics of a wetland. Know the primary benefits of wetlands and be able to name wetland functions and values.

7 Explain and identify the connection between land uses in a watershed and water quality. Including problems associated with land use changes. Utilize maps to determine the potential for water quality problems.

8 Be able to interpret water quality data for a body of water. Be familiar with the methods used to measure the water quality parameters turbidity, phosphorus, nitrate, pH, coliform bacteria and dissolved oxygen. Be able to explain the significance of these parameters to a water body and explain the possible causes and consequences when levels of these factors are high or low.

9 Know why the Clean Water Act and the Safe Drinking Water Act were enacted. Be familiar with the actions required by each to protect water quality.

12 **Forestry**

Station Manager: James "Trip" Miller, SC Forestry Commission

Learning Objectives:

1. Identify common South Carolina trees without a key.
2. Identify specific or unusual species through the use of a dichotomous key.
3. Understand how wildlife diversity relates to: forest communities, forest species, forest age structure, snags and den trees, availability of food and cover, and riparian zones.
4. Understand basic forest management concepts such as: harvesting techniques, regeneration methods, and insect and disease control.
5. Be familiar with the use of a Biltmore stick, compass and other forestry tools.
6. Understand the value of trees in urban/suburban settings and the factors affecting their health and survival.
7. Understand how following Best Management Practices will help protect soil and water quality.
8. Understand the effects of forestry practices on outdoor recreation in forested environments.

13 **Wildlife**

Station Manager: Tammy Wactor, SCDNR

Learning Objectives:

1. Identify habitat requirements for common wildlife species. Be able to use tracks and other signs, such as scat, feathers etc..., to identify common wildlife species.

2. Describe food webs (including predator-prey relationships) and cite examples.

3. Evaluate a given habitat for its suitability for a designated species, given a description of the habitat needs of the species.

4. Describe ways that habitat can be improved for specific species by knowing their habitat requirements.

5. Describe factors that limit or enhance population growth. Discuss the concept of carrying capacity and limiting factors.

6. Discuss various ways the public and wildlife managers can help in the protection, conservation, management and enhancement of wildlife populations.

7. Describe the potential impact of the introduction of non-native species.

8. Describe major factors affecting threatened and endangered species and methods used to enhance population growth and stability of these species. Be able to cite South Carolina examples.

9. Understand the roles of wildlife in an ecosystem.

10. Describe physical and behavioral adaptations among wildlife to their habitats and cite examples.

11. Understand the impact nuisance wildlife species can have within an ecosystem and the potential management issues that may arise.

14 **Recreational Impacts on Natural Resources**

Station Managers: Bryn Harmer & Crystal Robertson, SC Department of Parks, Recreation & Tourism

Learning Objectives:

1. Research the South Carolina Trail System. Be able to identify specific trail impacts and possible solutions or ways to prevent these impacts. Identify the different user groups that utilize trails in South Carolina and what impacts/problems can arise with each group.

2. Research the rising interest in Geocaching/Letterboxing. Identify the short term and long term social, political and environmental issues involved in this topic. Identify all stakeholders involved and the pros and cons this activity has on all parties.

3. Identify impacts associated with the operation of a Recreational Vehicle (RV) Campground. Research possible solutions to minimize these impacts.

4. Research the many causes of soil erosion/compaction and possible solutions to prevent this impact.

15 Oral Presentation

Station Manager: Lindsay Fairchilds, SCDNR

General Learning Objectives:

1 Research the scientific, political, historical and social issues surrounding the current topic. Evaluate the evidence and construct a solution for this issue.
2 Using materials and information gathered in your research, construct and present your solution to a diverse judging panel of resource and communications professionals using no more than 2 visual aids.
3 Respond to questions from the judging panel at the conclusion of your presentation. Questions may be direct (on the material you presented) or indirect (interpretive, based on assumed background knowledge).

Oral Presentation Scenario

Team members are asked to research issues and information surrounding the scenario below. Any source of information is allowed although teams should carefully screen their facts for accuracy and objectivity. Teams will be allowed ten (10) minutes to present, with two (2) minutes of question and answer period following the presentation. All team members must speak and participate in the presentation. Two visual aids will be allowed (see materials list on page 20).

Oral Presentation Written and Developed by:

Bryn Harmer & Crystal Robertson,
SC Department of Parks, Recreation & Tourism

Background

Letterboxing has been around as a recreational pastime for over 150 years. This was a secretive hobby in England which involved finding clues to a box's location then using the clues and a compass to find the box. The hobby moved to North America in 1989. Today there are approximately 181 letterboxes in South Carolina alone.

In 2000 the hobby of letterboxing got a technological makeover. The United States government allowed the average citizen the ability to access 24 satellites to enhance the accuracy of a handheld GPS receiver. A group of GPS users then decided to develop a game in which you hide a container, post the coordinates online, and allow others with a GPS to find it.

With the ever growing availability of personally owned GPS receivers, the activity quickly caught on. Today, January 1, 2008 there are 500,475 geocaches worldwide including 2,313 in South Carolina. Any recreational activity that is growing this rapidly has social, political, economic, and environmental impacts. Land managers need to weigh all these factors in order to make management decisions in relation to Geocaching.

Scenario

You and your team manage Carolina State Park. You have been approached by a group of geocachers who would like to place caches throughout your park.

There are 4 specific areas they would like to place the caches.

1. One is near a historic home
2. Another is along a hiking trail
3. The third is near a picnic shelter
4. The last is in an area that may have archeological value

You will need to decide:

1. What if any of the caches will be allowed?
2. What stipulations will be placed on these caches?
3. What is the responsibility of the cache placers, finders, and park personnel to insure the recreational activity remains low impact?

Factors to consider:

- Is this activity appropriate at this site?
- What will the impacts be?
- Does this area have the ability to withstand these impacts?
- Are there historical/cultural resources that will be impacted?
- Will the benefit of providing this type of recreation out weigh the impacts anticipated?
- How can expected impacts be avoided and/or minimized?
- How will the park benefit from this activity?
- How will visitors benefit from this activity?
- How will park operations impact the integrity of the cache? Example: prescribe fire, timber harvest, etc.

Your decision is to be compiled into a presentation to the geocaching group as well as higher level park service personnel.

Oral Presentation Rules

Materials allowed for visual displays:

Teams are limited to two (2) standard pieces of white poster-board (24"x30") prepared with markers, crayon, construction paper, tape, string, cut-out pictures, etc. No three dimensional creations are allowed (posters must be able to be stacked and stored compactly). Use one side of the poster only.

No presentation aids or materials other than the posters and index cards specified below will be permitted at the presentation. Students will be allowed five (5) 3.5 x 5 inch index cards each to assist them during the presentation. No materials other than the aids mentioned above will be allowed.

Scoring procedures:

A panel of judges with expertise in the current topic, natural resource management and public communications will score the presentation of each team using the score sheet found at the end of this section of the manual. Also included is a detailed explanation of the scoring procedure. In accordance with Canon Envirothon procedure, the highest and lowest scores will be dropped and the remaining three scores averaged. This average will be the team's score for Oral Presentation

South Carolina Envirothon
Judges Scoring Sheet for Team Oral Presentations

Scale for Scores: 0 = not at all; 2 = poor or poorly; 4 = fair or slightly well; 6 = good or well; 8 = excellent or very well; 10 = outstanding

Team Number_____

Judge's Initials_____

Part 1: Preparation and Presentation (60 Points maximum) Circle Score - post total here ===>	
A. How well did the presentation address or identify:	
1. The interrelationship between natural resources, different management strategies and human health and well being.	0 2 4 6 8 10
2. All the stakeholders affected.	0 2 4 6 8 10
3. Relevant influences on or by the major resource areas (soil, water, forestry, wildlife).	0 2 4 6 8 10
4. Knowledge of the impacts of recreational activities on natural resources	0 2 4 6 8 10
5. Other environmental problems related to the issue.	0 2 4 6 8 10
B. Were references and resources sited in the presentation?	0 2 4 6 8 10

Part 2: Application of the Data (80 Points maximum) **Circle Score** - post total here ===>	
A. Team demonstrated a solid understanding of the political issues related to the problem	0 2 4 6 8 10
B. Team demonstrated a solid understanding of the environmental issues related to the problem	0 2 4 6 8 10
C. Team demonstrated a solid understanding of the economic issues related to the problem	0 2 4 6 8 10
D. Team demonstrated a solid understanding of the social/cultural issues related to the problem	0 2 4 6 8 10
E. Team presented ONE viable opinion/solution to the problem	0 2 4 6 8 10
F. All main parts of the presentation were clearly stated and supported	0 2 4 6 8 10
G. Solution(s) presented address(es) the long-term sustainability of the resources	0 2 4 6 8 10
H. The land use decision proposed addresses the concerns of all stakeholders	0 2 4 6 8 10

Part 3: Quality of the Presentation (40 points maximum) Circle Score - post total here ===>	
A. Presentation was well organized with a clear introduction and a strong conclusion.	0 2 4 6 8 10
B. Participants enhanced the presentation with eye contact, gestures, voice inflection, and Originality	0 2 4 6 8 10
C. Visual aids were used to support major points.	0 2 4 6 8 10
D. Questions from the judging panel were answered logically and concisely.	0 2 4 6 8 10

Part 4: Required Elements (20 points) **Circle Score** - post total here ===>	
A. Two points for each team member that participated in oral presentation.	0 2 4 6 8 10
B. Up to five points if presentation was accomplished in the allotted time.	0 2 4 6 8 10
C. Up to five points if a plan (solution) was presented.	0 2 4 6 8 10

Part 1 total (60 points max) _____ **Part 2 total (80 points max)** _____

Part 3 total (40 points max) _____ **Part 4 total (20 points max)** _____

Final Score_____

16 A Clarification of the Envirothon Judging Sheet

In order to ensure the consistency of judging, the following guidelines have been prepared. In general, the point values can be interpreted as follows (see a more detailed analysis for each category below):

0- Not at all.
2- Major misconceptions or gaps; ineffective, inadequate, inappropriate.
4- Some misconceptions or flaws; minimally effective, somewhat appropriate.
6- Complete, and accurate; effective, adequate and appropriate.
8- Complete, very detailed, logical, ideas well supported and well organized; highly effective, all details appropriate.
10- Profound, in-depth, done in an insightful manner; extremely effective, points to an extremely effective strategy.

AN EXPANSION OF EACH SECTION OF THE JUDGING SHEET:

PART I: PREPARATION AND PRESENTATION OF THE PLAN (60 POINTS MAX)

A. How well did the presentation address or identify:

1. The interrelationship between the environment, natural resources, and different natural resource management strategies?

0- Not at all.
2- Major flaws or misconceptions in the interrelationships.
4- Identified most of the key interrelationships but had some misconceptions or gaps
6- Identified key interrelationships appropriately and adequately, along with appropriate management strategies.
8- Presents major and minor interrelationships and management strategies in a clear and effective manner with supporting evidence.
10- Addresses all interrelationships and develops a most effective combination of management strategies in a logical, insightful and well defended manner addressing all aspects of the problem.

2. All the different players/interest groups affected by the problem?

0- No players identified.
2- Only one or two players identified with major flaws in their interests or who is affected.
4- Most of the players and their interests presented with some misconceptions or gaps.
6- All the major players identified appropriately with their viewpoints accurately expressed.
8- Major and minor players identified and their interests are accurately expressed in a well organized manner.
10- Very comprehensive analysis of the players and their needs and interests, done in a well organized and insightful manner clearly conveying the complexity of the issue. Done in a clear and very logical presentation.

The judging criteria for section A, 3-5 is similar. Use the following criteria for these sections: 3- 5. How well did the presentation address or identify: 3) The major natural resources areas (aquatics, forestry, soils, wildlife), 4) changes needed to protect the resource from recreational activities, 5) the specific environmental problem (the oral scenario)?

0- None at all.
2- Many of the issues involved are not covered or major misconceptions in addressing these issues.
4- All the main issues (where appropriate) are addressed but there are misconceptions or gaps in how they are addressed.
6- All key issues (where appropriate) are addressed in an adequate manner.
8- Major and minor issues (where appropriate) are addressed in a detailed and appropriate and logical manner with support information.

10- All major and minor issues affected (where appropriate) are addressed in a multidisciplinary manner. The analysis is profound, in-depth, done in an insightful manner. All issues addressed are done utilizing extremely effective strategies.

B. Were references and resources cited in the team presentation?

0- None cited
2- Only one or two sources are cited or citations are inappropriate for their use.
4- Several resources cited, however there are gaps in the citations
6- Four or five resources cited and used appropriately.
8- Adequate resources cited from several different viewpoints supporting the major points of the presentation.
10- All points are supported with citations from many different viewpoints. Citations and resources used shows in-depth research and a desire to investigate all major areas of concern. Citations listed in an organized fashion.

PART II APPLICATION OF DATA (80 points maximum)

The format of the judging in sections A-D is very similar. For sections A-D judges can use the following criteria. The team demonstrated a solid understanding of: A) political, B) ecological/environmental, C) economic, D) social and cultural issue(s) related to the problem.

0- No (A- political, B- ecological/environmental, C- economic, D- social and cultural) issues considered.
2- Only a few of the considerations are mentioned or their understanding of the issues has major flaws.
4- Most of the major considerations are presented and addressed, however there are some misconceptions or gaps in the presentation.
6- All the major considerations are identified and addressed in an appropriate manner.
8- A detailed presentation of the considerations is given in a well supported and organized manner. A high level of understanding is also exhibited in the question and answer period.
10- The analysis of the issues is very complete and in-depth. These issues are presented in a well thought-out and insightful manner which shows a complete understanding of the considerations and how they should be addressed. A high level of understanding is also exhibited in the question and answer period.

E. The team presented ONE viable solution to the problem addressing the resource issue.

0- No plan presented.
2- The plan has major flaws and is inadequate or inappropriate.
4- The plan presented has numerous minor flaws with gaps in the topics it addresses.
6- The plan addresses all the key concerns and provides a reasonable solution to the problem.
8- The plan provided covers the concerns of the problem very completely, and is presented in a detailed, logical and well organized manner.
10- The plan provided addresses all the aspects of the problem in an elegant, in-depth manner. The solution developed is insightful, very effective, and efficient.

F. The main parts were clearly stated and supported, (conclusion was clearly defined and convincing).

0- No supporting details for the conclusions reached.
2- Supporting details are severely flawed, confusing, or have large gaps in the presentations. The conclusion does not match the material presented.
4- Some of the supporting details are provided but have some misconceptions or have several gaps. The conclusion is unclear or unconvincing.
6- All the main points are clearly stated with supporting details. The conclusion matches the supporting details.
8- The presentation is organized in a very logical manner. All the major and minor points are supported accurately and cover the topic completely. The conclusions clearly come from the body of the presentations and are very convincing. This includes clearly showing how the conclusion was reached after considering the alternatives.
10- The body of the presentation clearly lays out the details of the conclusion with supporting details.

This is done in a highly effective manner. The presentation is insightful and detailed leading to a most convincing conclusion. This includes clearly showing how the conclusion was reached was an extremely effective solution.

G. Solution in the presentation has potential to be applied or implemented with long term sustainability to natural resources.

0- No solution is provided.
2- The solution presented is unrealistic or has major misconceptions or flaws.
4- The solution presented is somewhat workable but contains some misconceptions or flaws.
6- The solution presented is workable and presents solutions to short-term and long-term problems. The solution is adequate and accurate. It covers all the major areas of concerns.
8- The solution presented is detailed, complete and realistic. It provides for the long-term sustainability of natural resources in a cost effective and addresses all the concerns.
10- The solution presented provides an insightful, multidisciplinary approach to the problem. All natural resource concerns are dealt with in a manner which allows for short-term concerns and long-term sustainability. The solution proposed clearly supports how it addresses all the concerns by utilizing an extremely effective alternative.

H. Did the solution reflect or address the concerns of all affected groups and issues?

0- No attempt was made to address the concerns of affected groups and issues.
2- The needs of most groups affected or issues have not been addressed.
4- The needs of most groups have been considered but many have not been addressed adequately.
6- The needs of most groups and issues have been addressed in an adequate fashion.
8- The needs of all the groups and issues have been addressed in a complete and detailed manner.
10- The needs of all the groups and issues have been addressed by combining the common interests in the most effective manner while not jeopardizing the long-term sustainability of environment and balancing political, economic, social and cultural concerns. This is done in detailed and insightful manner that shows sensitivity to needs of all groups affected.

PART III QUALITY OF THE PRESENTATION (40 points maximum)

A. Presentation was well organized with a clear introduction and strong conclusion.

0- No introduction or conclusion.
2- Introduction and/or conclusion are very hard to follow with very little organization in the presentation.
4- Introduction and/or conclusion are somewhat difficult to follow. Minimal organization in the rest of the presentation.
6- Clear introduction and strong conclusions. Adequate organization throughout the presentation.
8- Clear introduction and strong conclusion. The presentation has a very logical flow and is very well organized.
10- Excellent organization throughout. The presentation is very easy to follow and compelling. The organization enhances the understanding and keeps one's full attention throughout the presentation.

B. Participants enhanced the presentation (eye contact, gestures, voice inflection, originality, exhibited professionalism, etc.).

0- No attempt to engage the audience - monotone voice, no eye contact, etc.
2- Very limited presentation skills for a majority of the presenters leading to an ineffective presentation.
4- Several of the presenters have limited presentation skills.
6- All the presenters do an adequate job of presentations using the skills listed above.
8- All the presenters utilize good presentations skills leading to an effective presentation.
10- Extremely effective presentation skills used appropriately in a variety of ways leading to a creative and highly effective presentation.

C. Visual aids were used to make major points and show conclusions (visual aids should be correct, eye appealing, readable, neat, etc.).

0- No visuals.
2- Visuals are unreadable, messy, or contain major flaws in the information.
4- Visuals contain minor flaws or do not convey the major points or conclusions completely.6-Visuals convey the major points and conclusion in an adequate manner, no spelling errors, legible, neat and appealing.
8- Visuals convey the major points and conclusions (including all the features listed above) in an particularly eye catching manner.
10- Creative and very effective use of visuals to convey the major points and conclusions. Visuals greatly enhance the presentation and are used in a highly appropriate manner.

D. Questions were answered logically and concisely by all team members participating.

0- No questions answered.
2- Answers contain many major misconceptions or gaps.
4- Answers contain some misconceptions or flaws.
6- Answers are accurate and adequate. All the team members are involved in answering the questions.
8- Answers given by all the members are concise and organized in a logical manner. All the details are appropriate.
10- Questions are answered in an insightful manner (as well as being logical and concise). The answers show an in-depth understanding of the material.

PART IV REQUIRED ELEMENTS (20 points)

A. Add up to ten points for each team member's participation in the presentation (Each team member gets up to 2 points for equal oral participation in presentation. (For each team member: 0- No participation, 1- limited participation, 2- full participation).

B. Add up to five points if the presentation was accomplished in the allotted time scale and the team made effective use of their time. (I pt.- presentation lasted 1-2 minutes, 2 pts.- presentation lasted 3-4 minutes, 3 pts.- presentation significantly over time limit (>6 minutes), 4 pts.- presentation within (±) 1 minute of the allotted time, 5 pts.- presentation within (±) 30 seconds of the allotted time.

C. Add up to five points if the presentation accomplished the task of presenting a plan.

0- No plan presented.
I- Plan with major misconceptions or gaps.
2- Plan with some misconceptions or flaws.
3- Plan is complete and accurate.
4- Plan is complete, very detailed, logical, well supported and well organized.
5- Plan is profound, in-depth, insightful and extremely effective.

17 Glossary of Environmental Terms:

Adaptation: Changes in an organism's physiological structure or function or habits that allow it to survive in new surroundings.

Archaeology: study of past human cultures by examining the materials remains and other deposits left at archaeological sites such as shell rings and mounds. Trained professionals only conduct archaeology, but opportunities to visit with archaeologists often arise.

Artifact: An object that has been manipulated by human hands into a tool or implement.

Biltmore Stick: This scaling tool is a straight wooden stick graduated for direct readings of tree diameters and heights. The stick allows you to measure the diameter at a point 4.5 feet above stump height and also the merchantable height in terms of 16 foot logs. With these two measurements, the board foot volume of the tree may be determined. The actual volume table is printed on the stick.

Biodiversity: Refers to the variety and variability among living organisms and the ecological complexes in which they occur. Diversity can be defined as the number of different items and their relative frequencies. For biological diversity, these items are organized at many levels, ranging from complete ecosystems to the biochemical structures that are the molecular basis of heredity. Thus, the term encompasses different ecosystems, species, and genes

Bioenergy: Energy derived from biofuel.

Biofuel: Any fuel derived from biomass. Agricultural products specifically grown for conversion to biofuels include corn and soybeans. Research and development is currently being conducted to improve the conversion of non-grain crops, such as switchgrass and a variety of woody crops, to biofuels.

Biological Oxygen Demand (BOD): An indirect measure of the concentration of biologically degradable material present in organic wastes. It usually reflects the amount of oxygen consumed in five days by biological processes breaking down organic waste.

Biomass: Organic material made from plants and animals, containing stored energy from the sun. Biomass is a renewable energy source because we can always grow more trees and crops, and waste will always exist. Some examples of biomass fuels are wood, crops, manure, and some garbage.

Buffer Strip: A relatively undisturbed section of forest adjacent to an area requiring special attention or protection such as a stream or lake.

Carrying Capacity: 1. In recreation management, the amount of use a recreation area can sustain without loss of quality. 2. In wildlife management, the maximum number of animals an area can support during a given period.

Cave: Any natural cavity or series of cavities beneath the surface of the earth. Such cavities are usually classed as caves only if they are large enough to permit entrance by humans. The term is generally synonymous with cavern and is commonly applied also to wind- or water-eroded rock cavities.

Chiefdom: highest level of social organization reached by prehistoric Native Americans. Chiefdom usually has status differences, depends on an agricultural economy, build monumental architecture such as mounds.

Dichotomous Key: A two branched key that can help you quickly identify trees in the field. Leaves are used for the identifying characteristics. Each line in the key has two choices. Read the descriptions on these two lines and decide which fits your tree best. The choosing between two characteristics continues through the key until identification is complete.

Dissolved Oxygen (DO): The oxygen freely available in water, vital to fish and other aquatic life and for the prevention of odors. DO levels are considered a most important indicator of a water body's ability to support desirable aquatic life. Secondary and advanced waste treatment is generally designed to ensure adequate DO in waste-receiving waters.

Ecofact: a non-artifact such as pollen, animal bones, and shellfish remains, antler tine or carving, carbonized materials such as wood, nuts, corn or other plant remains.

Ecosystem: The interacting system of a biological community and its non-living environmental surroundings.

Electricity: The flow of electrical power or charge and is a secondary energy source. The energy sources we use to make electricity can be renewable or non-renewable, but electricity itself is neither renewable nor non-renewable.

Energy Conservation: The practice of decreasing the quantity of energy used while achieving a similar outcome of end use.

Endangered Species: A species of native fish, wildlife, or plants found by the Secretary of the Interior to be threatened with extinction because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of over exploitation, disease, predation, or other factors its survival requires assistance.

Environmental Justice: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Feature: Features are of great interest to archaeologists. Features can be large like mounds or shell rings, or small like a posthole for a prehistoric house or a deposit of periwinkle shells within a shell ring. A hearth used 800 years ago to heat a clay walled hut is yet another type of feature.

Fecal Coliform Bacteria: Bacteria found in the intestinal tracts of mammals. Their presence in water or sludge is an indicator of pollution and possible contamination by pathogens.

Feedstock: A substance used as a raw material in an industrial process. Biomass feedstocks include herbaceous and woody energy crops, agricultural food and feed crops, agricultural crop wastes and residues, wood wastes and residues, aquatic plants, and other waste materials including some municipal wastes.

Fossil Fuel: A general term for buried combustible geologic deposits of organic materials, formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years.

Ground Water: The supply of fresh water found beneath the Earth's surface usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

Geothermal Energy: Taps into heat underneath the Earth's crust to boil water that is then used to drive electric turbines to heat buildings, homes, or in other non-electrical purposes.

Habitat: The physical area where an organism lives.

Hydrogen: The most abundant element in the universe, and an important factor in our energy future. Hydrogen fuel cells can produce power without emitting any pollutants; their only byproducts are water and heat. Hydrogen can both carry and store energy and can be used in a wide variety of applications, including portable devices that use batteries, transportation vehicles, and a number of stationary power sources.

Hydropower: The capture of the energy of moving water for some useful purpose. Hydropower plants capture the energy of falling water to generate electricity. A turbine converts the kinetic energy of falling water into mechanical energy. Then a generator converts the mechanical energy from the turbine into electrical energy.

Impaired Streams: Streams that do not meet the water quality standards set by the state based on classified uses (ie. fishing, swimming, shellfish).

Infrastructure: The basic network or foundation of capital facilities or community investments which are necessary to support economic and community activities.

Karst: The typical surface terrain of a limestone region, characterized by an abundance of sinkholes, disappearing streams, exposed rock outcrops or ledges, and underground caverns.
Late Archaic Period: a period from roughly 5000-3000 years ago. During this time complex hunter-gatherer tribal societies began to construct shell rings, fashion pottery vessels and live a semi sedentary lifeway.

Limiting Factor: A condition whose absence or excessive concentration is incompatible with the needs or

tolerance of a species or population and which may have a negative influence on their ability to thrive.

Mississippian period: a period from 1000 to four hundred years ago. During this time earthen mound building, corn agriculture, and complex societies living in permanent villages were ruled by ruled by hereditary chiefs.

Mound: Artificially constructed village feature constructed of baskets loads or dirt, shaped like a truncated cone and used as a platform for chief's houses temples or both.

Non-Point Source of Pollution: Diffuse pollution sources (i.e. without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by storm water. Common non-point sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets.

Non-renewable: Energy resources, such as coal, oil and natural gas that cannot be replenished by nature as fast as they have been used. It took hundreds of millions of years to form many of these resources and they are in limited supply.

Nuclear Energy: Energy in the nucleus (core) of an atom. There is enormous energy in the bonds that hold atoms together. Nuclear energy can be used to make electricity, but first the energy must be released. It can be released from atoms in two ways: nuclear fusion (when atoms combine) and nuclear fission (when atoms split).

Shell Ring: Artificial deposit of shell occurring as a ring, crescent, horseshoe shape or mound of shell and other artifacts and ecofacts.

Renewable Energy: Any sustainable energy source that comes from the natural environment. The most common forms of renewable energy are solar, wind, water or hydro, biomass and geothermal energy. Renewable energy sources are maintained or replaced by nature, relatively quickly, after use.

Solar Power: The technology of obtaining usable energy from the light of the sun. Solar energy is the solar radiation that reaches the earth and can be converted directly or indirectly into other forms of energy, such as heat and electricity.

Active Solar Systems: Use solar collectors and additional electricity to power pumps or fans to distribute the sun's energy. The heart of a solar collector is a black absorber which converts the sun's energy into heat. The heat is then transferred to another location for immediate heating or for storage for use later.

Passive Solar Systems: Do not use any mechanical equipment to move the sun's energy. This technique uses building elements such as walls, windows, floors and roofs, in addition to exterior building elements and landscaping, to control heat generated by solar radiation.

Photovoltaic Solar Systems: Photovoltaic (PV) cells convert sunlight to electricity. PV cells are semiconductor devices, usually made of silicon, which contain no liquids, corrosive chemicals or moving parts. They produce electricity as long as light shines on them, require little maintenance, do not pollute and operate silently.

Sustainability and **Sustainable Living:** The ability to achieve continuing economic prosperity while protecting the natural systems of the planet and providing a high quality of life for its people.

Tidal Power: Achieved by capturing the energy contained in moving water mass due to tides. Two types of tidal energy can be extracted: kinetic energy of currents between ebbing and surging tides and potential energy from the difference in height between high and low tides.

Traditional Energy: The sources and methods we currently use to generate stable, inexpensive, and readily available supplies of energy.

Wind Power: The conversion of wind energy into more useful forms, usually electricity using wind turbines (machines for converting the kinetic energy in wind into mechanical energy).

18 Bibliography

WEBSITES

GENERAL

Canon Envirothon - www.envirothon.org

Academy of Natural Sciences - *choose the article index*
http://www.acnatsci.org/erd/ea

Clemson University Cooperative Extension Service
- choose Public Service Activities - Extension
http://www.clemson.edu/

Environmental Literacy Council
http://www.enviroliteracy.org/

Librarians Index to the Internet
http://sunsite.berkeley.edu/InternetIndex/

Scientific American: Ask the Experts
http://www.sciam.com/askexpert/

South Carolina Department of Health and Environmental Control
http://www.sc.dhec.gov

South Carolina Department of Natural Resources
http://www.dnr.sc.gov

South Carolina Forestry Commission
http://www.state.sc.us/forest

South Carolina State Library
http://www.state.sc.us/scsl/

Environmental Education Link
http://www.nceet.snre.umich.edu

Environmental Protection Agency - Acting Locally - Information for Citizens
http://www.epa.gov/epahome/acting.htm

Internet Public Library - click on both biology and environmental science
http://www.ipl.org/ref/RR/static/sci0000.html

Teaching KATE (Kids About The Environment)
http://www.teachingkate.org

USDA Natural Resources Conservation Service
http://www.nrcs.usda.gov/

U.S. Geologic Survey - has biology and geology information and sources
http://www.usgs.gov/

South Carolina Legislature
http://www.Leginfo.state.sc.us

Soil and Water Conservation Society *- click on Public Policy and Organization Links*
http://www.swcs.org

EPA National Service Center for Environmental Publications
http://www.epa.gov/ncepihom/

Bibliography (Continued)

SOILS

Bryn Mawr College, Dept. Geology teaching module on soil formation

http://www.brynmawr.edu/Acads/Geo/Soil/ProcessHome.html

Earth and Sky, geology and astronomy, ask an expert, Feature articles

http://www.earthsky.com

National Soil Survey Center

http://www.statlab.iastate.edu/soils/nsdaf/

USDA NRCS Technical References

http://www.ftw.nrcs.usda.gov/tech_ref.html

USDA NRCS World Soil Resources Website

http://www.nhq.nrcs.usda.gov/WSR/

Dr. Soils Surfs - a searchable index of soils webpages

http://www.agri.upm.edu.my/jst/drsoil.html

How to Measure Soil Texture (low tech and easy)

http://weather.nmsu.edu/Teaching_Material/soil456/soiltexture/soiltext.htm

University of Florida Cooperative Extension (excellent explanation of soil texture triangle and field determination techniques)
http://edis.ifas.ufl.edu/scripts/htmlgen.exe?DOCUMENT_SS169

United Nations Environment Program (global soil database - see data access section)

http://grid2.cr.usgs.gov/

NRCS Web Soil Survey - http://websoilsurvey.nrcs.gov/app/

S.K.Worm - http://www.nrcs.usda.gov/FEATURE/education/squirm/skworm.html

WATER

EPA's Office of Water Homepage: www.epa.gov/ow

DHEC's Bureau of Water: www.scdhec.gov/water

USGS Water Science for Schools: www.ga.water.usgs.gov/edu

Center for Watershed Protection: www.cwp.org

Surf your watershed: www.epa.gov/surf

Know your watershed: www.ctic.purdue.edu

Ohio State NPS Pollution primer: www.ag.ohio-state.edu/~ohioline/aex-fact/0465.html

SC Home*A*Syst - program for reducing Household NPS

http://virtual.clemson.edu/groups/waterquality/HOMASYS.HTM

Collaborative Projects - Global Water Sampling Project (background, procedures, and expected test result ranges for water quality tests)

http://www.k12science.org/curriculum/waterproj/watersamplingtests.html

Stream Study (aquatic macroinvertebrates and sampling procedures) http://wsrv.clas.virginia.edu

Groundwater http://www.groundwater.org

The Hydrologic Cycle – online meteorology guide

http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/hyd/home.rxml

Bibliography (Continued)

Groundwater Basics from the Groundwater Primer, Purdue University

http://www.purdue.edu/dp/envirosoft/groundwater/src/basics.htm #menu "**How to delineate a watershed** (and read a topographic map) (NH NRCS)
http://www.nh.nrcs.usda.gov/technical/WS_delineation.html

Congressional Research Service Report – Safe Drinking Water Act Amendments of 1996
http://cnie.org/NLE/CRSreports/water/h2o-17.cfm

EPA's Watershed Academy Web: Introduction to the Clean Water Act(html version),
http://www.epa.gov/watertrain/cwa/ (pdf version, 4.3MB, 70 pages)
http://www.epa.gov/watertrain/pdf/IntrotoCWA.pdf

FORESTRY

Learning Objective Resource

1 Identify Common Trees*Tree Identification for SC*; forester
2 Identify trees with a key*Tree Identification, A Guide to Helping Your Students Learn Tree ID;* forester
3 Understand wildlife habitat...*Forest Mgt. & Wildlife*
4 Understand forest management....*Managing the Family Forest in the South: The Natural Role of Fire*
5 Be able to use Biltmore stick *Making & Using Your Own Cruiser Stick;* forester
6 Understand urban tree value*Benefits of Urban Trees*
7 Understand BMP's Forestry BMP's
8 Understand climate change http://www.gov.mb.ca/est/climagechange/pdfs/cc_primerdoc.pdf

http://www.state.sc.us/forest/prod1004.pdf

http://www.fpl.fs.fed.us/tmu/documents/primer_on_wood_biomass_for_energy.pdf

http://www.fs.fed.us/research/pdf/biomass_importance.pdf

http://www.scbiomass.org/Publications/Potential%20Biomass%20Energy%20in%20SC.pdf

www.fl-dof.com/publications/fires_natural_role.html

WILDLIFE

SC Department of Natural Resources
www.dnr.sc.gov

Nearctica: Natural History of North America

http://www.nearctica.com/index.htm

U.S. Fish and Wildlife Service - Endangered species website

http://www.fws.gov/r9endspp/endspp.html

USFWS - National Wildlife Refuge System Management

http://refuges.fws.gov/wildlife.html

USFWS - Southeast Region

http://www.fws.gov/r4eao/

National Wildlife Federation

http://www.nwf.org/

South Carolina Wildlife Federation

http://www.scwf.org/

Bibliography (Continued)

National Audubon Society's explanation of the Endangered Species Act
http://www.audubon.org/campaign/esa/Basics.htm

CURRENT ISSUE

Geocaching

Geocaching - The Official Global GPS Cache Hunt Site
www.geocaching.com

Geocache Rating System
www.clayjar.com/gcrs/

Garmin: Introduction to Geocaching Manual
www.garmin.com/outdoor/geocaching/manual.html

Geocaching in Daniel Boone National Forest- KY
www.fs.fed.us/r8/boone/recreation/geocaching.shtml

Paperless Geocaching
http://www-cs-students.stanford.edu/~delse/geocaching.html

SC Geocaching Organization
www.scgeocaching.com

Trails

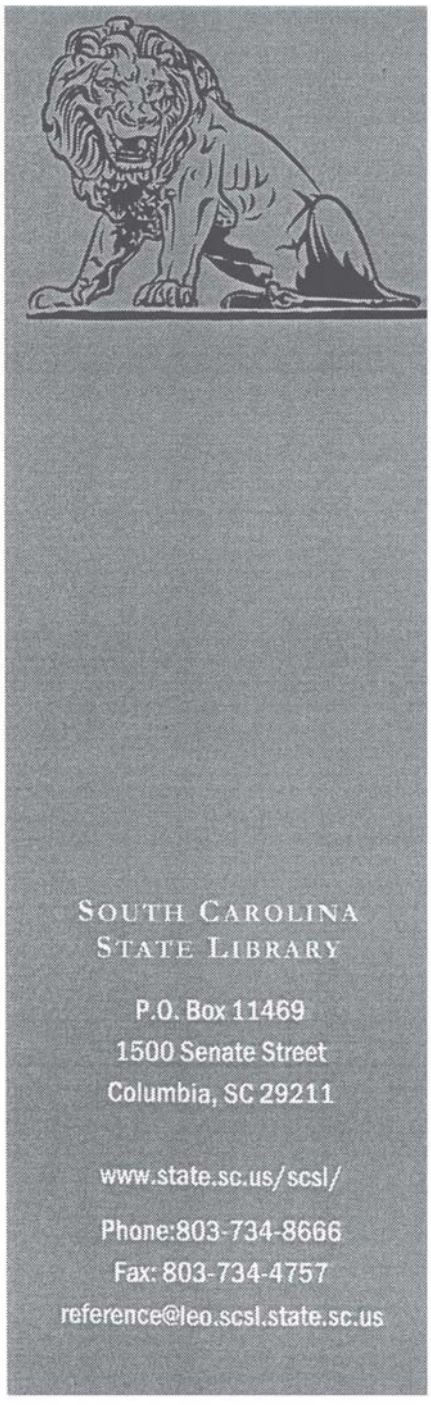
South Carolina State Parks
www.southcarolinaparks.com

Palmetto Trail
www.palmettoconservation.org

Trail Maintenance- California Parks and Rec
http://www.foothill.net/fta/work/maintnotes.html

South Carolina Trails System
sctrails.net

Envirothon Information Pathfinder



The school media center and the public library are excellent places to locate the facts and information that you need to compete in South Carolina's **Envirothon.** The South Carolina State Library has developed pathfinders for each topic to assist you in finding information in your local library or through the Internet. Your local librarian can also help you find the sources you need.

Books and Reports

Go to the library's catalog and search for titles under the following subject headings:

AQUATICS

Water
Groundwater
Water Quality
Water Conservation
Water Supply

SOIL

Soils
Soil Conservation
Soil Erosion
Soil Surveys

FORESTRY

Forests and Forestry
Forest Conservation

WILDLIFE

Wildlife
Nature Conservation
Wildlife Conservation
Ecology
Wildlife Management
Endangered Species

NOTE: NEW WEB ADDRESS:
http://www.statelibrary.sc.gov/

Online Databases

Full text information contained in magazines, newspapers, government reports and encyclopedias are available in the following databases at your library and school media center:

InfoTrac databases include the full text of articles from about

1500 magazine and professional journal titles; the full text of reference books, pamphlets, and news wire services; abstracts of articles from several thousand additional periodical and newspaper titles.

Grolier Online Encyclopedias includes Encyclopedia Americana Online and Grolier Multimedia Encyclopedia Online.

SIRS Knowledge Source covers social, scientific, arts, and other topics, providing full-text articles from a wide variety of sources. Databases include SIRS Researcher and SIRS Government Reporter.

Internet

The Internet can be an excellent source for information on the Envirothon topics. There is a list of selected sites in your Envirothon manual. Be sure to check out your favorite search engine for additional information. Don't forget to evaluate the Internet site for accuracy, currency, content and organization.

19 State Park Offices

Park	Phone
Aiken State Natural Area	803-649-2857
Andrew Jackson State Park	803-285-3344
Baker Creek State Park	864-443-2457
Barnwell State Park	803-284-2212
Caesars Head State Park -The Mtn. Bridge	864-836-6115
Calhoun Falls State Recreation Area	864-447-8267
Charles Towne Landing State Historic Site	843-852-4200
Cheraw State Park	843-537-9656
Chester State Park	803-385-2680
Colleton State Park	843-538-8206
Colonial Dorchester State Historic Site	843-873-1740
Croft State Natural Area	864-585-1283
Devils Fork State Park	864-944-2639
Dreher Island State Recreation Area	803-364-4152
Edisto Beach State Park	843-869-2756
Givhans Ferry State Park	843-873-0692
Goodale State Park	803-432-2772
H. Cooper Black Jr. Field Trail and Rec Area	843-378-1555
Hamilton Branch State Recreation Area	864-333-2223
Hampton Plantation State Historic Site	843-546-9361
Hickory Knob State Resort Park	800-491-1764
Hunting Island State Park	843-838-2011
Huntington Beach State Park	843-237-4440
Jones Gap State Park- The Mtn. Bridge	864-836-3647
Keowee-Toxaway State Natural Area	864-868-2605
Kings Mountain State Park	803-222-3209
Lake Greenwood State Recreation Area	864-543-3535
Lake Hartwell State Recreation Area	864-972-3352
Lake Warren State Park	803-943-5051
Lake Wateree State Recreation Area	803-482-6401
Landsford Canal State Park	803-789-5800
Lee State Natural Area	803-428-5307
Little Pee Dee State Park	843-774-8872
Musgrove Mill State Historic Site	864-938-0100
Myrtle Beach State Park	843-238-5325
Oconee State Park	864-638-5353
Oconee Station State Historic Site	864-638-0079
Paris Mountain State Park	864-244-5565
Poinsett State Park	803-494-8177
Redcliff Plantation State Historic Site	803-827-1473
Rivers Bridge State Historic Site	803-267-3675
Rose Hill Plantation State Historic Site	864-427-5966
Sadlers Creek State Recreation Area	864-226-8950
Santee State Park	803-854-2408
Sesquicentennial State Park	803-788-2706
Table Rock State Park	864-878-9813
Woods Bay State Natural Area	843-659-4445

20 Society of American Foresters

South Carolina Chapters:

Contact the forester in your area for: Help in preparing students for Envirothon, assistance in finding forestry tools, financial help (a chapter may help sponsor your school's group).

Project Foresters

County	Forester	Phone	Business Address
Abbeville	Michael McGill	(864)225-9701	P.O. Box 1041, Anderson,SC 29622
Aiken	Brandon Heitkamp	(803)259-3373	7695 Highway 64, Barnwell, SC 29812
Allendale	Brandon Heitkamp	(803)259-3373	7695 Highway 64, Barnwell, SC 29812
Anderson	Michael McGill	(864)225-9701	P.O. Box 1041, Anderson,SC 29622
Bamberg	Brandon Heitkamp	(803)259-3373	7695 Highway 64, Barnwell, SC 29812
Barnwell	Brandon Heitkamp	(803)259-3373	7695 Highway 64, Barnwell, SC 29812
Beaufort	James Douglas	(803)943-3915	PO Box 486, Hampton,SC 29924
Berkeley		(843)899-2221	1668 Main St., Bonneau, SC 29431
Calhoun	Stephen Crown	(803)534-3543	353 Fire Tower Rd, Orangeburg, SC 29118
Charleston		(843)556-3371	2730 Savannah Hwy, Charleston,SC 29414
Cherokee	Roy Boyd	(803)325-1926	2790 Fire Tower Road, Rock Hill,SC 29730
Chester	Roy Boyd	(803)325-1926	2790 Fire Tower Road, Rock Hill,SC 29730
Chesterfield	James Brunson	(843)498-6918	16222 Hwy. 1, Patrick, SC 29584
Clarendon	Ryan Bean	(803)494-8488	5500 Wedgefield Hwy, Wedgefield, SC 29168
Colleton	Nathan Rutherford	(843)538-3708	413 Sidneys Rd. , Walterboro,SC 29488
Darlington	James Brunson	(843)498-6918	16222 Hwy. 1, Patrick, SC 29584
Dillon	Eric West	(843)382-8761	596 I.M. Graham Road, Kingstree, SC 29556
Dorchester		(843)556-3371	2730 Savannah Highway, Charleston, SC 29414
Edgefield	Jaime Jones	(864)445-7031	122 Firetower Road, Saluda, SC 29138
Fairfield	Chase Folk	(803)276-0205	39 General Henderson Rd., Newberry,SC 29108
Florence	Chet Foyle	(843)382-8761	596 I.M. Graham Road, Kingstree, SC 29556
Georgetown	Tonya Harrington	(843)382-8761	596 I.M. Graham Road, Kingstree, SC 29556
Greenville	Paul Dulin	(864)878-6134	301 University Ridge Suite 3900, Greenville,SC 29601
Greenwood	Jaime Jones	(864)445-7031	122 Firetower Road, Saluda, SC 29138
Hampton	James Douglas	(803)943-3915	PO Box 486, Hampton,SC 29924
Horry	Tonya Harrington	(843)382-8761	596 I.M. Graham Road, Kingstree, SC 29556
Jasper	James Douglas	(803)943-3915	PO Box 486, Hampton,SC 29924
Kershaw	Ryan Bean	(803)494-8488	5500 Wedgefield Hwy, Wedgefield, SC 29168
Lancaster	James Brunson	(843)498-6918	16222 Hwy. 1, Patrick, SC 29584
Laurens	Skip Burnette	(864)878-6134	PO Box 391, Pickens,SC 29671
Lee	Ryan Bean	(803)494-8488	5500 Wedgefield Highway, Wedgefield, SC 29168
Lexington	Holly Welch	(803)276-0205	39 General Henderson Rd., Newberry,SC 29108
McCormick	Jaime Jones	(864)445-7031	122 Firetower Road, Saluda, SC 29138
Marion	Tonya Harrington	(843)382-8761	596 I.M. Graham Road, Kingstree, SC 29556
Marlboro	James Brunson	(843)498-6918	16222 Hwy. 1, Patrick, SC 29584
Newberry	Chase Folk	(803)276-0205	39 General Henderson Rd., Newberry,SC 29108
Oconee	Michael McGill	(864)225-9701	P.O. Box 1041, Anderson,SC 29622
Orangeburg	Stephen Crown	(803)534-3543	353 Fire Tower Road, Orangeburg, SC 29118
Pickens	Skip Burnette	(864)878-6134	PO Box 391, Pickens,SC 29671
Richland	Chase Folk	(803)276-0205	39 General Henderson Rd., Newberry,SC 29108
Saluda	Jaime Jones	(864)445-7031	122 Firetower Road, Saluda, SC 29138
Spartanburg	Brad Bramlett	(864)583-3438	725 Hwy. 56 S.,Spartanburg,SC 29302

Sumter	Ryan Bean	(803)494-8488	5500 Wedgefield Highway, Wedgefield, SC 29168
Union	Holly Welch	(803)325-1926	2790 Fire Tower Road, Rock Hill,SC 29730
Williamsburg	Chet Foyle	(843)382-8761	596 I.M.Graham Road, Kingstree, SC 29556
York	Roy Boyd	(803)325-1926	2790 Fire Tower Road, Rock Hill,SC 29730

21 USDA-NRCS, SCDNR & Conservation District County Offices

Abbeville District Office
394 Highway 28 By-Pass
Abbeville, SC 29620
(864) 459-5419, ext. 3

Aiken District Office
1555 Richland Avenue, Suite 400
Aiken, SC 29801
(803) 649-4221, ext. 3

Allendale District Office
398 Barnwell Highway, Rm.113
Allendale, SC 29810
(803) 584-4234, ext. 3

Anderson District Office
1521 Pearman Dairy Road
Anderson, SC 29625
(864) 224-4201

Bamberg District Office
3828 Main Highway
Bamberg, SC 29003
(803) 245-4311, ext. 3

Barnwell District Office
100 Fuldner Road
Barnwell, SC 29812
(803) 259-7144

Beaufort District Office
817 Parris Ave.
P.O. Box 70
Port Royal, SC 29935
(843) 522-8100

Berkeley District Office
P.O. Box 6122, 1003 Hwy 52
Moncks Corner, SC 29461
(843) 719-4146

Calhoun District Office
904 F.R Ruff Dr. Ste. 104
P.O. Box 528
St. Matthews, SC 29135
(803) 874-3337, ext. 3

Charleston District Office
4045 Bridge View Drive, Suite C-204
North Charleston, SC 29405
(843) 727-4160, ext. 3

Cherokee District Office
1252 Overbrook Drive, Suite 5
Gaffney, SC 29341
(864) 489-7150

Chester District Office
744 B. Wilson Street
Chester, SC 29706
(803) 581-1908, ext. 3

Chesterfield District Office
106 Scotch Road
Chesterfield, SC 29709
(843) 623-2187, ext. 3

Clarendon District Office
9B West Rigby Street
Manning, SC 29102
(803) 435-2612, ext. 3

Colleton District Office
531 Robertson Blvd., Suite B
Walterboro, SC 29488
(843) 549-1821, ext. 3

Darlington District Office
300 Russell Street, Rm. 228
Darlington, SC 29532
(843) 393-0483, ext. 3

Dillon District Office
106 West Washington Street
P.O. Box 609
Dillon, SC 29536
(843) 774-8641 or 9577

Dorchester District Office
5809 W. Jim Bilton Blvd.
St. George, SC 29477
(843) 563-3218, ext. 3

Edgefield District Office
304 Gray Street
Edgefield, SC 29824
(803) 637-3220, ext. 3

Fairfield District Office
414 B. South Congress Street
Winnsboro, SC 29180
(803) 635-4831

Florence District Office
215 Third Loop Rd. Ste. 400
Florence, SC 29505
(843) 669-9686, ext. 3

Georgetown District Office
1837 N. Fraser Street
Georgetown, SC 29440
(843) 546-7808

Greenville District Office
301 University Ridge,
Suite 3900
Greenville, SC 29601
(864) 467-2755

Greenwood District Office
115 Enterprise Court, Ste. A-1
Greenwood, SC 29649
(864) 229-3004, ext. 3

Hampton District Office
1005 Elm Street, East
Hampton, SC 29924
(803) 943-2586, ext. 3

Horry District Office
1949 Industrial Park Road, Rm. 125
Conway, SC 29526
(843) 365-7923

Jasper District Office
406 W. Main St. Rm 128
Ridgeland, SC 29936
(843) 726-7611. ext. 3

Kershaw District Office
1126 Little Street
Camden, SC 29020
(803) 432-2576

Lancaster District Office
1771-A 521 Bypass South
Lancaster, SC 29720
(803) 286-4455

Laurens District Office
221 A Laurens Street
Laurens, SC 29360
(864) 984-6921

Lee District Office
129 Fairview Avenue
Bishopville, SC 29010
(803) 484-6325

Lexington District Office
123 Park Road
Lexington, SC 29072
(803) 359-3165, ext. 3

Marion District Office
119 Palmetto Pointe Dr. Ste. A
Marion, SC 29571
(843) 423-1742

Marlboro District Office
210 Throop Street
Bennettsville, SC 29512
(843) 479-4552

McCormick District Office
P.O. Box 1958
McCormick, SC 29835
(864) 465-2594

Newberry District Office
719 Kendall Road
Newberry, SC 29108
(803) 276-0032, ext. 3

Oconee District Office
301 W. South Broad Street
Walhalla, SC 29691
(864) 638-2213, ext. 3

Orangeburg District Office
1550 Henley Street, NE, Rm. 103
Orangeburg, SC 29115-5020
(803) 534-2409, ext. 3

Pickens District Office
P.O. Box 245 144
McDaniel Avenue
Pickens, SC 29671
(864) 878-6155

Richland District Office
2020 Hampton Street, Rm. 3044
P.O. Box 192
Columbia, SC 29202
(803) 576-2080

Saluda District Office
201 East Church Street
Saluda, SC 29138
(864) 445-8118

Spartanburg District Office
105 Corporate Drive Ste. G
Spartanburg, SC 29306
(864)814-2471

Sumter District Office
1975 Castlerock Dr.
Sumter, SC 29153
(803) 905-7650, ext. 3

Union District Office
200 S. Mountain Street
P.O. Box 1136
Union, SC 29379
(864) 429-2801

Williamsburg District Office
502 Martin Luther King Jr. Ave
Kingstree, SC 29556
(843) 354-9621

York District Office
1460 E. Alexander Love Hwy.
York, SC 29745
(803) 684-3137, ext. 101

NOTES: